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SUSTAINING SUBURBIA – THE IMPORTANCE OF THE PUBLIC PRIVATE INTERFACE IN THE CASE OF CANBERRA, AUSTRALIA

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Keywords

sustainable city; sustainable suburbia; public-private interface; green space

Abstract

Among existing and anticipated changes in global urbanisation and population growth, the challenge of retrofitting suburbia within sustainable cities needs to be considered. However, given the opposing nature of sustainability and suburbia, this task is not easy. Different approaches have tried to define the theory for achieving sustainable cities, but the nature of suburbia presents issues in densification, as density is perceived to limit the liveability and importantly the private sphere that makes suburbia desirable. To begin addressing sustainability in suburbia, the question of how to densify suburbs while maintaining their liveable quality, needs to be addressed. Focusing on the case of Canberra the paper builds a framework for discussing these questions within analysis of suburb density, behavioural studies and the public private interface. In doing so, it is evident that sustaining suburbia through densification, within the context of sustainable cities, cannot be considered without recognising morphology and the need for, and integration of, the public private interface.

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INTRODUCTION

With the current and predicted growth of urban populations, there is a necessity to reconsider the sustainability of cities (Adams, 2011). As part of this process of global urbanisation, one of the most important challenges will be retrofitting the existing suburbs (Talen, 2011). The questions of how to make suburbs more sustainable are listed as one of three major tasks for cities (Bugliarello, 2006). One of the central concerns within this trend is urban sprawl and the integration of density and concentration. In recent years there has been an increase in research that focuses on the sustainability of suburbia, as well as proliferation of rating systems that are assessing the sustainability of suburban neighbourhoods. However, sustainability and suburbia are two, almost paradoxical, concepts in their essential meaning. Suburban development predominantly consists of detached houses one or two stories high, producing a very low density in addition to mono-functional spaces and vast distances; thus resulting in a heavily car dependant way of life. In contrast with suburbia, sustainable cities promote high density, compact urban form and mixed-use function with integrated public transport.

On the other hand, if sustainability is defined as the survival of society, then it is most often linked with liveability and the quality of life (Bugliarello, 2006: 24). Privacy is highly affected in dense areas and we might argue that those positive aspects of the suburban way of life, which make it more liveable, are discarded as part of sustainable development agendas. Living in detached housing, having space, privacy and a rural sense of connection to land, together with separation of functions and having quiet neighbourhoods, are some of important elements which influence why people still chose to live in suburbs (Grant, 2002: 78) and define them as ‘liveable’. In addition, increasing density and generating a more compact way of living, is often associated with neoliberal intentions of maximising profit and minimising the quality of living space (Crabtree, 2005). While it does create a more energy efficient way of living, it neglects some aspects of liveability; the sustainability agendas are currently focusing on generating more dense areas without looking at the quality of these spaces and how to transform suburbia to be more sustainable.

There are various approaches to sustainable cities, Green City, Smart City and Compact City are some of the most prominent current approaches in theory. However, almost no discussion is focusing on sustainable suburbs (Davison, 2006). Usually suburbia in literature is treated as ‘other’ urban areas that need to be retrofitted to become more compact and denser (Kashef, 2009: 89). There are four approaches identified in literature that aim to overcome the problems of current unsustainable cities. There are those that are inspiring from middle age European small cities (Neotraditional Developments, such as New Urbanism) or those related with legislation (Urban Containment, an approach proposing to simply define the boundary and stop further spread of the city) and Compact City and Eco-City approaches (Jabareen, 2006). All these concepts are observing sustainable suburbs from the aspects of densification. In addition, when discussing sustainable suburbia in research, most often, densification, mobility strategies and walkable distances to everyday functions are put forward. Sustainable urban form is defined through density, diversity, connectivity, accessibility and connectedness to other places (Talen, 2011:961). However, there are other important aspects of sustainability, such as social and cultural (Roisman, 1998), which are rarely discussed as part of sustainable suburbia. Because these approaches aim to transform suburbia into urban areas, there is a lot of rejection of dealing

with the sustainability of suburbia. However, the population living in suburban developments continues to rise and if we do want to consider a more sustainable future, this issue will need to be addressed.

There are also almost no discussions on what we are trying to sustain in the definition of suburban sustainability. Depending on how we define sustainability, we could discuss various forms of sustainable cities. In addition to lack of discussions on what we are trying to sustain in our current cities, there is a question of the measurability of sustainability. Although it has been recognised in literature that there is a challenge to applying the compact city principles to existing suburbs (Williams, Joynt, & Hopkins, 2010), there are almost no considerations on characteristics of new suburbs that are claiming to be sustainable. Nearly all cities have, as part of their future planning developments, the word sustainability in their agendas; with some cities already applying sustainability measures. However, aside from the governments saying that they are developing sustainable suburbia, without any clear definition of the aspects of sustainability that they are focusing on, it is difficult to say how successful these attempts are; especially given suburbia's paradoxical situation.

To begin addressing sustainability in suburbia, the challenging question remains, how do we densify and at the same time maintain the quality of suburbia? How do we redesign existing suburbs, but generate more sustainable living? How do we capture the quality of suburban spaces and go beyond the oversimplifying measures of suburb densification?

This paper aims to open the discussion of the above issues and uses the example of Canberra's recently developed suburb Franklin that is claiming to be sustainable. We aim to take the discussion beyond the usual way of looking at the simple densification of suburbs. We argue that the boundary between public and private spaces provides a basis for the qualitative character of suburbia, and that the structure of this space can be used as a framework to discuss sustainable living in suburbia. The paper aims to map and analyse the boundary space between built and un-built spaces and tests if public-private interface spaces could reveal some of the qualitative aspects of suburbia and provide an overview of sustainability beyond simple densification measures. The aim of the paper is not to promote sustainability of suburbia, but to provide a framework for discussion if the concept of suburbia were to be transformed to be sustainable without losing its essential qualities.

To open the discussion on quality and the challenges of suburban living, we will first examine the relationship between urban and rural; outline a concept of urbanity and connection with landscape, and their manifestations within the public-private boundary spaces. This relationship is also very important for the context of Canberra, as it was designed with the strong consideration of the landscape where the "bush" has also become an important part of the city identity (Vernon, 2006). Secondly, the paper will define the public-private interface spaces and generate types based on the fieldwork observations.

PUBLIC-PRIVATE INTERFACE AND RELATIONSHIP BETWEEN URBAN AND RURAL

The discussion between urban and rural spaces is not a new one. At the beginning of 20th century there was a considerable shift from urban and dense conditions in cities as a

response to overcrowding, diseases and difficult living situations (Choay, 1969). This is when the idea of urban, considered as positive and sophisticated way of life (Ramage, 1973), has started to change its meaning. With the industrial revolution and migration to cities, nature has gained importance in everyday life in the cities. This period can be characterized by some of the most prominent plans from Ebenezer Howard, Le Corbusier and Frank Lloyd Wright, all focusing on a way to bring nature back into the city and deal with overcrowding.

Those responses to the overcrowding could be grouped into two major categories, depending on the relationship to the landscape (the ground). One response is the horizontal spread of the city with lower density and organization around the centres of activity and networks. The idea central to this approach is keeping the connection with the ground and organizing everything horizontally. One of the most prominent concepts of this kind was Garden Cities (Aalen, 1992). The Garden City concept was developed in England to reduce density and regain the connection to nature. The main characteristics of the proposed diagrammatic idea of the Garden City were around zoning that separated centres of activity such as residential and industry, with limitations in density, planned parks and connection to green spaces (Ward, 1992). It might be argued that suburbia belongs to this category of development. The second extreme approach deals with the vertical city and its connection with the sky. The expansion of the city is thus vertical and promotes high density (for example Le Corbusier's plans for Contemporary City for Three Million People).

Development of suburbs has its place within this dichotomy between urban and rural aspects of the city. Although the perception of suburban developments has been shifting from pro to anti-suburbia, where positive aspects of democracy, freedom and escape from the urbanity and industrial city have changed to fairly negative views at suburban developments within frameworks of sustainability (Davison, 2006: 208), suburban developments keep expanding and creating the problems of sprawl. In Australia, Davison argues that suburbia is where Australian identity is created, influencing "Australian self-understanding" (2006: 207). Suburbia promotes the importance of nature and connection to the land, but it is also generating sprawl through its consumerist approach to mass production and car dependence.

One of the most important parameters that define suburbia is the private aspect of everyday life, the idea of the detached house and a connection to the landscape. Thus, it could be argued that the central element ensuring the quality of suburban life is the way in which the house meets the ground, firstly, the threshold between public and private spaces and secondly private garden. It is this aspect of sustainable suburbia that will be the most affected with densification. That is why this paper is exploring the question of the level of densification in relation to the interface space and discusses when dense becomes too dense and loses the liveable aspects of suburbia.

Public private interface is defined as the space between the public of the street and the private spaces in the house. This threshold space is recognised as the most important space in architecture, with some theories arguing that this is the space where architecture emerges, as it not only defines how the building contributes to the city but also how people experience the private space of the house. In addition, this space is identified as the space that needs to be carefully considered by urban planners and architects (Bobic, 2004: 46). The way in which this space is generated, defines the atmosphere and level of urbanity of the city (see for example Jacobs (1961), Gehl (2011)). This boundary space consists of interface area and transition area. Interface area is the space that stands between building and the public

space, for example the front garden of residential houses. Transition area, is the point where interior and exterior spaces meet, such as entrance point (Bobic, 2004).

METHODS AND CASE STUDY

To open the discussion on sustainable suburbia from a qualitative perspective, this paper will use the case study approach and outline the relationship between density and public-private interface. The hypothesis is that results from comparative analysis will demonstrate firstly the importance of the thresholds to understand sustainability beyond energy efficiency, and secondly, the directions of sustainable suburban developments in Canberra. Latter results are of a subordinate nature, as we have been testing the methods for analysis, rather than trying to generate conclusions about Canberra. To have more solid conclusions about state

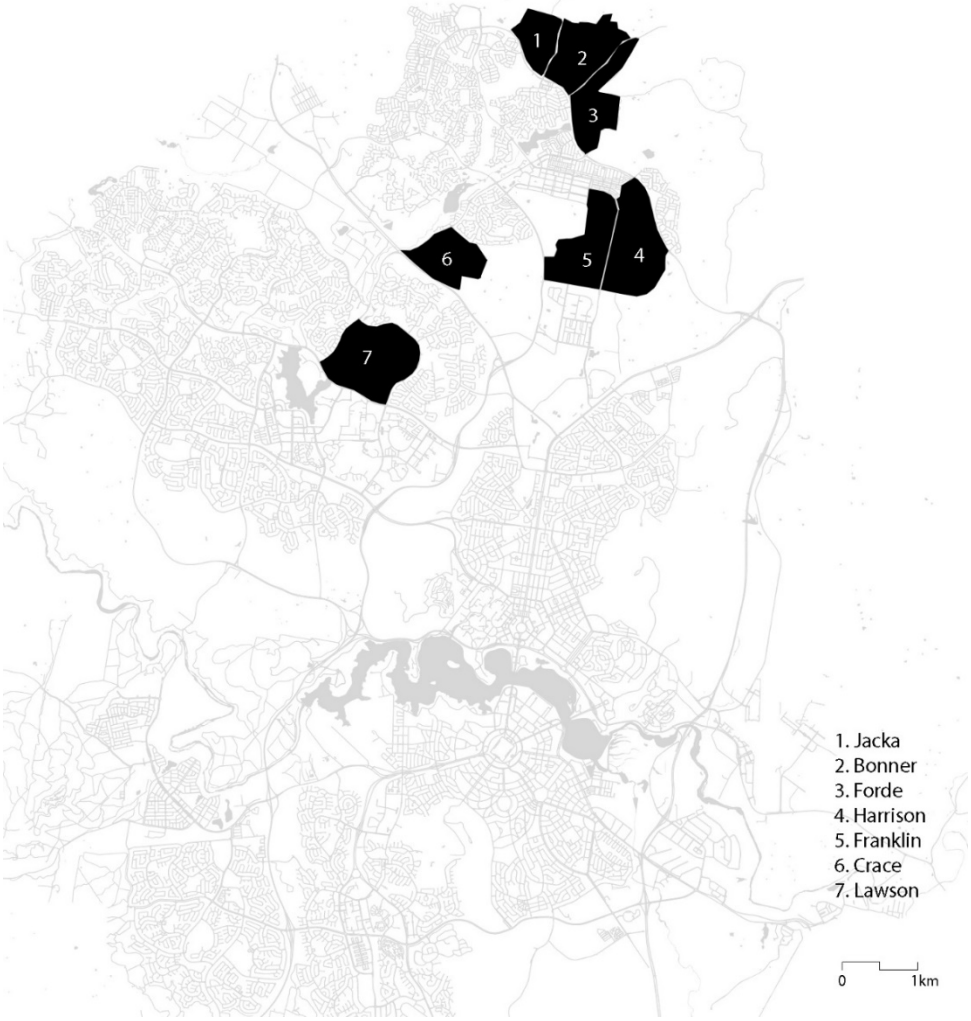

Figure 1. Contextual map showing recent Canberra suburb developments (Source: Authors based on GIS data, 2018).

of suburbia in Canberra, we would need to study all new developments and compare them with the old suburbs. Since the aim of this study is to discuss how to approach the sustainability of suburbia, at this stage we are testing the methods.

The paper uses mapping of public-private interface and density as elements to analyse sustainability and suburban character. Public-private interface is proposed in this analysis as a tool for understanding the relationship between sustainability and liveability. This element is compared with the integrated methodological approach combining the density and behavioural observations usually applied in discussions of sustainable cities. To define public-private interface, the paper uses sectional analysis and generates eight main types of transitional spaces that are identified during the fieldwork and analyses them through sectional drawing and mapping. Types are defined based on size of the threshold and character of the build space. Permeability of the interface was not considered, as most of the types had the same low permeability characteristics, and as such this quality was omitted from the generation of types. The number and sizes of types were mapped and visualised to define the density and character. Public-private interface is, for this study, considered as the space between two buildings, comprising the space of the street or public green and spaces in between the street and the building itself. This was due to the convenience of the mapping and obvious connection and fluidity of the spaces on both sides of the streets. Density is measured through morphological study that focuses on the build form and population. Behavioural observations were conducted in four strategically selected locations (Figure 5.) based on the distribution and functional analysis in Franklin (Figure 2.). The four locations include: (1) Henry Kendall Street dominantly single and medium density residential areas; (2) Gwen Meredith Loop single and medium density residential areas adjoining community facilities; (3) Oodgeroo Avenue dominated with single residential area and large open community green space and (4) Hoskins Street dominantly single residential area. The observations were conducted during four weeks period in Jun 2017 and comprise both weekdays and weekends. The direct and counting observations occurred in 15min counting sessions followed with 15min direct observation sessions to capture both peak and after peak activities following the adapted approach by Jan Gehl (Gehl and Svarre, 2013). All the results are represented through maps, demonstrating not only a visualising tool, but a tool that enables comparison of results.

The density data was gathered from document analysis and statistical data of government reports, direct observation and recordings from the fieldwork. The comparison between public-private types and density and behavioural analysis provide the basis for the discussion on the evaluation of sustainability and questions of sustainable suburbia. Data for maps was derived from ACT Government Open Geospatial Data and were mapped and visualised using Arc GIS 10 software.

The case study was selected as one of the recent suburbs built in Canberra that is claiming to apply the sustainability agenda for the city development. Canberra is a designed city that follows some of the principles of Garden City and City Beautiful Movement (Headon, 2013). These aspects are bringing together the importance of the landscape and connection with nature that were incorporated from the beginning of the plan for the city (Taylor, 2007; Watson, 1927). In addition, suburbia has an important place in Australian cities. Thus, it is a good place to test some of the ideas of sustainable urban form, as the city was designed to incorporate low density and connection to the nature; the Bush Capital (Vernon, 2006). While this city structure was aimed to have the connection with land, sprawl in recent decades has created car dependency. There have been attempts to achieve more sustainable living in

Canberra and the ACT (2012) Government has adopted a plan that focuses on a more compact approach to building, working towards more sustainable suburbia. This aligns with the recent "Time to Talk Canberra 2030: Outcomes Report" which showed that people desire more dense, accessible and connected suburbs (ACT Government and Elton Consulting, 2010). As such, the ACT Government has been integrating sustainable approaches through a focus on social properties or sustainable communities (ACT Government, 2012; 2009; 2008).

Table 1. Comparison of Franklin with other suburbs in Canberra (based on ABS accessed Sep 2018).

Suburb	Year established	No. of residents	Size	Density	Single detached dwellings	Semi detached dwellings	Apartments
O'Connor	1928	5481	4.9km^2	1119/km^2	65.8%	14.4%	19.3%
Curtin	1962	5238	4.8km^2	1091/km^2	84.1%	5.1%	10.8%
Kaleen	1974	7271	6km^2	1212/km^2	93.8%	5.2%	1%
Franklin	2007	6419	2.3km^2	2790/km^2	50.5%	19%	30.5%

Figure 2. Distribution of building types in Franklin (Source: Authors, 2018).

Within the aspects of density, ACT Planning Authorities are committed to achieving the sustainability of the suburbs, while also ensuring that green spaces are created so as to align with the importance of the "bush" in the Australia's capital. Having this in mind, all suburbs built after 2004 are those that have been implementing the sustainability agendas and promoting the identity of Canberra as a city integrated within the landscape. There are seven suburbs in Canberra built after 2004 (Jacka, Bonner, Forde, Harrison, Franklin, Crace and Lawson see Figure 1.). Within all these suburbs, Franklin was one of the first designed under the 2004 Canberra Spatial Plan, with majority of development commenced in 2007 and completed in 2009 (ACT Government, 2017a). Since the suburb is already developed and time has passed since its development, this suburb is good case to observe implementation of sustainable strategies. The 2016 census shows a current population of 6419 people, with the prediction of 2% growth in next five- six years (Australian Bureau of Statistics [ABS], 2017a; ABS, 2017b, ABS, 2012). The comparison of Franklin with earlier suburbs in Canberra is shown in the Table 1 indicating the changes in suburb density and morphology over time.

Franklin has been designed to provide a variety of housing options to accommodate the growth following "new sustainable suburbs" agenda developed under the ACT Government. The structure of the residential typology is 50.5% single detached dwellings, 30.5% apartments, and 19% of semi-detached or townhouse dwellings (ABS, 2017a). The suburb also follows the connectedness and public transport accessibility required by ACT Government (2008).

In addition to residential types, Franklin also has its own local shops, school and recreational facilities, with open spaces and natural landscape incorporated to meet the requirements outlined as part of Canberra's identity. The proximity of Gungahlin, a major central node for North Canberra, orientates Franklin towards local mobility (for example, 43.2% of the surrounding suburb population, among which is Franklin, is employed in Gungahlin town centre according to ACT Government, 2012). Franklin is also located in the proximity of Civic (a central commercial and office district in Canberra) and Mitchell (an industrial suburb in Canberra). As it belongs to RZ3 urban residential zone categorisation in accordance with "Territory Plan", this provides predominantly residential, low to medium density (RZ3- Urban Residential Zone (ACT), 2016, 1). However, Franklin also has RZ5 mixed-use zones that are fostering higher density residential development, with better accessibility and public transport, "efficient and sustainable urban environment", "using the best practice environmentally sustainable development principles" and encouraging street activity (CZ5 Mixed Use Zone (ACT), 2016, 1). The neighbourhood centre is around recreational facility that serves as community centre and other commercial facilities are located in the mixed-use developments (Figure 2). The suburb also has RZ4 medium-density residential zones and CZ4 local culture zones. All these zones are designed to generate a sense of community and certain level of locality and independence. Thus, Franklin is selected as representative of sustainable processes accepted in Canberra's recent suburban developments.

ANALYSIS AND RESULTS

Density

Residential density in Franklin is 16.74 dwellings per hectare, which belongs to the low-density development range. In addition, single dwellings comprise 50.5% of the built form (ABS, 2017a) (Figure 2). The sizes of plots in Franklin are 300-500m2 indicating higher

density compared with other suburbs in Canberra. However, this is a general trend found in new suburbs that reduces the size of plot and increases the size of the house, thus generating smaller and smaller backyards (Hall, 2015). Appearing to increase in density is not an actual increase, but increase in building area ratio. Overall, density data in Franklin showed that this suburb is statistically denser than earlier Canberra suburbs, but on the ground is visually not much different from suburbs in Canberra, planned and built before the implementation of sustainability agendas.

In addition to the low density of built environment, Franklin has vast amounts of public open spaces, with approximately 47 hectares easily accessible and spread throughout the whole suburb (Figure 3). With a population of 6419 people, the amount of green space, in the form of natural landscape, recreational park and natural grassland (Figure 4), is more than double the recommended Australian Standard of 3 ha every 1000 people (Ambrey & Fleming, 2014). This means that there is enough space for significant increase in population.

Figure 3. Open space and 15 minute walking radius (Source: Authors).

Figure 4. Natural landscape, recreational park and natural grassland in Franklin (Source: Authors).

Behavioural Analysis

Based on the study conducted in 2017 there were four main activities in the space observable: vehicle traffic, cycling, walking and ruining, kids play and people with pram and people waiting for bus. There were significant differences in numbers of cars during the weekday and weekend, the numbers plunging to more than a half during the weekend. However, in all cases the number of vehicles has been significantly larger than number of pedestrians in the street. There were substantial differences in the number of people present on the street, the largest of those were located in the observation area 2 comprising 26% of all activities. This space is located close to community areas; thus it was expected to have larger numbers, however, they are very low, compared to car traffic. The completely residential space in area 4 demonstrates very low pedestrian activities. Area 3 shows moderate activities, which are connected to the open green space and similarly, area 1 which is located in proximity to mixed-use spaces has moderate pedestrian activity (Figure 5).

Figure 5. Distribution of activities in Franklin (Source: Authors, based on fieldwork conducted in 2017).

Public-private interface analysis

The analysis of open and built spaces as part of the public-private interface indicates that there is large amount of public open space and fairly small amounts of private open space. The types of street section demonstrate the condition in suburb (Figure 6 and Table 2.).

There were eight types of boundary spaces identified in the suburb, based on the size of the interface area and the condition of the transition area.

The results of mapping the types of transitional spaces show that the most dominant type of the boundary space is type 2 covering 51.5% of the area. It is followed with type 1 (30%), type 3 (9%), type 4 (3.5%), type 5 (3%), type 7 (2%), type 8 and type 6 (less than 1%) of the whole interface area (Figure 7). We might argue that type 1 is the space that comprises that essential quality of connection to the green spaces to the land; despite the fact that this green space is public. On the other hand, type 2 still preserves some of the qualities of the connection with the ground, but limited by the street and without extension beyond it. Both types are promoting low density. Furthermore, all the interface types with higher density are disconnected from the ground, instead generating a visual connection to the sky. Thus, the street space becomes only transport space, without extension of the private space into the public, and therefore loses the character of suburbia, the connection to the ground and semi-private space, as well as neighbourhood feeling. At the same time, that boundary does not create the sense of urbanity, as the street becomes only transient area to go through. The protection of private space in the apartment building, due to the proximity of the public and higher density, does not generate sense of urbanity nor a sense of suburban qualities.

Table 2. Types of public-private interface (Source: Authors).

Type of public private interface	**Interface area** (area between the buildings and the public space)	**Transition area** (entrance point)
type 1	Extends from single dwelling all the way to open green space. The physical boundary is marked with the line of the pavement that separates pedestrian path from the front garden. However, the visual boundary extends to the open public green space creating fluidity that crosses the road barrier. The physiological boundary extends from the private space of the house to the public space of the street and open green space.	Defined with single family house that has direct entrance from the open space of interface area.
type 2	Marked between single dwelling and the street. Physical boundary is marked with the line of the pavement between private garden and pedestrian path. Visual and physiological boundary overlaps with physical boundary, because of the single dwelling across the street.	Defined with single family house that has direct entrance from the open space of interface area.
type 3	Marked between single dwelling and townhouse. Physical boundary is denoted on the pavement for the single-family house and the townhouse defines a wall generating a visual barrier from the street. While visual and psychological barriers extend to the street, the townhouse is clearly separated with the wall. Visual connection happens on the first floor and it is cut off at the ground level.	Single family house has direct entrance from the street. Townhouse entrance happens on the wall barrier in front of the house.
type 4	Marked between two townhouses. The boundary is clearly defined with the fence. Visual boundary is marked with the fence on the ground level and extends from the first floor to the street. Physiological boundary overlaps with physical boundary.	Townhouse entrance happens on the wall barrier in front of the house.
type 5	Marked between townhouse and open green space. Physical boundary is defined with the fence and overlaps with psychological and visual boundary on the ground level but extends from the first floor towards green space.	Townhouse entrance happens on the wall barrier in front of the house.
type 6	Marked between apartment block and single dwelling. Single dwelling physical boundary defined with the front garden and apartment building generates interface space inside the block. There is no clear connection to the ground. Ground floor apartments are separated with the fences. Physiological and visual boundaries	Defined with single family house that has direct entrance from the open space of interface area. Apartment building

	are located towards the street and connect to the street space only from the first floor upwards.	entrance is not visually clear.
type 7	Marked between apartment building and the townhouse. Clearly separated with the fences on both sides of the street. Visual and psychological connections are extending towards the street on the first floor upwards.	Townhouse entrance happens on the wall barrier in front of the house. Apartment building entrance is not visually clear (it might be argued that it shifts to the interior of the building to the door of single dwelling unit).
type 8	Marked between two apartment buildings. Boundary is not clearly defined. Visual and psychological extend on the first floor and upwards, no clear connection to the ground.	Apartment building entrance is marked on the ground level (it might be argued that it shifts to the interior of the building to the door of single dwelling unit).

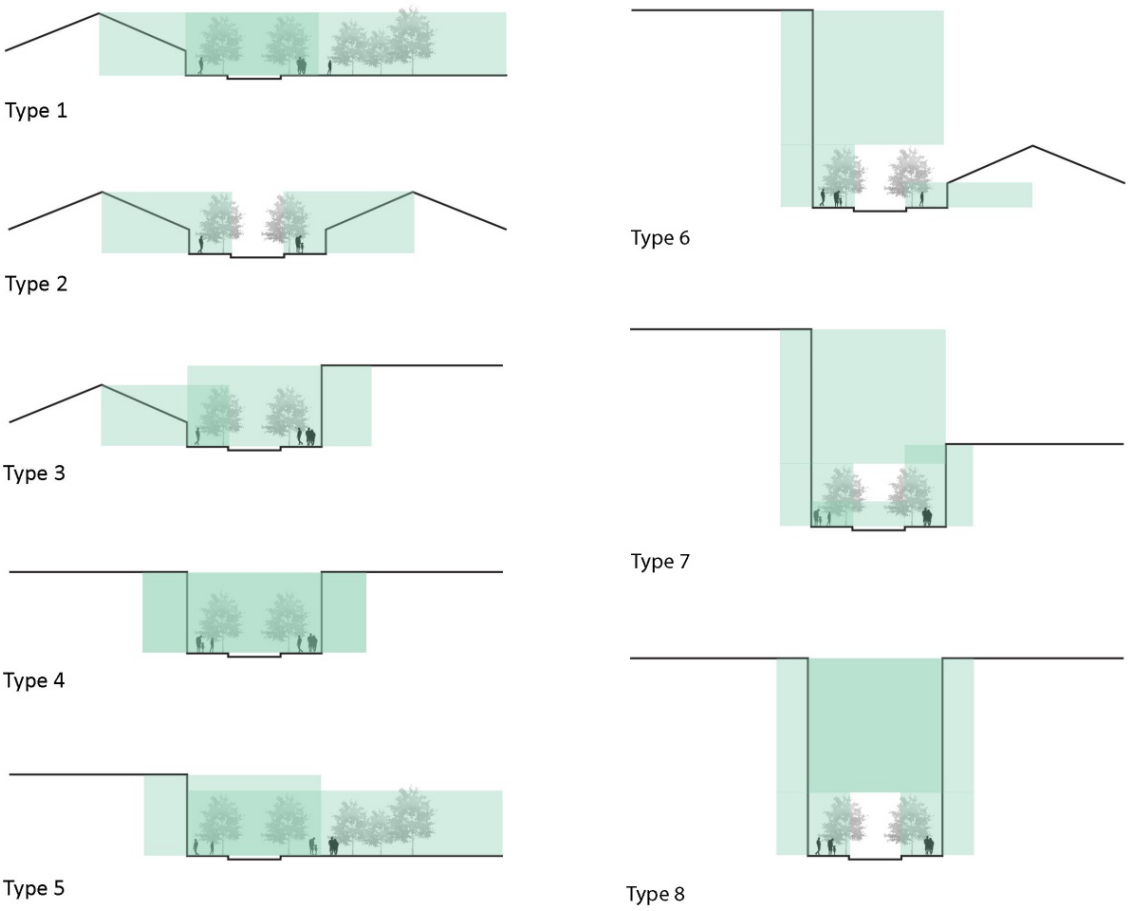

Figure 6. Diagrammatic representation of public private interface types (Source: Authors).

Figure 7. Distribution of public private interface types (Source: Authors).

CONCLUSION

Comparison of the density, behaviour and public-private interface results shows that there are similarities in analysis' outcomes (such as the fact that single dwellings were present in 50.5% of dwellings and that type 2 comprises similarly 51.5% of interfaces). Observational studies have shown an expected outcome, in that where there is very low pedestrian activity on the street there is greater car dominance. The studies also indicated that most pedestrian activity occurred within the proximity of communal spaces and open green spaces. However, the interface results reveal detailed information about the quality of the spaces in the suburb. According to density information, we could conclude that for Franklin to be more sustainable, it should increase its density. Similarly, according to behavioural study we could conclude that Franklin needs more mixed-use spaces to have more sustainable mobility and lifestyle. Nevertheless, results deriving from public private interface show that considering aspects of liveability and suburbia, the conclusion is not that simple.

Analysis of already densified interface types (6-8), demonstrates that they are not providing suburban nor urban qualities. The results show that main quality of suburbia is lost already in type 1 and 2 because of the limitation of private green spaces. The public open green space compensates for that lost (such as in type 1). However, the vast amount of open space is grouped and generates more of a barrier than a sense of connection and community in the suburb. Thus, instead of providing a positive effect for processes of reduction of the private land and possibility for higher density, it seems to be having the opposite outcome of generating even less sustainable conditions. Nevertheless, in relationship with the single

dwelling (type 1), it extends the private sphere of the house and thus contributes to quality of private spaces connection to landscape. Thus, we might argue that open public green space has the potential to act as essential in preserving the quality of suburbia. The way in which it is designed could be reconsidered from the aspects of size and accessibility, so that it does not create a barrier but can be accessible from most of the dwelling units.

Furthermore, an important aspect revealed from the public-private interface study is related with the connection to ground. Making the blocks smaller and houses larger reduces the size of private garden, thus the connection with ground starts to diminish. Therefore, the front public-private interface becomes an important space that connects to the ground.

There is also misunderstanding that density affects the qualities of suburban connection to the landscape in which those qualities are lost. That disconnection is happening before the density is reached as part of the new developments, developments that reduce the size of the plot and disconnect the house from the street under the goal of the protection of privacy and better comfort.

Furthermore, introducing densification of suburbia does not really generate dense enough spaces, nor does it preserve the quality of suburban life. We need to consider the quality of the connection to the ground to enhance sustainability; otherwise we will end up repeating the developments of compact cities (in the best case scenario). Densification of suburbia might be the solution towards more sustainable future of our cities, however, that densification needs to be reconsidered from the aspects of public-private interface, if we still want to build sustainable suburbia.

REFERENCES

Aalen, F. H. A. (1992). *English Origins* in S. V. Ward (Ed.), The Garden City: Past, Present and Future. London and New York Spon Press.

Australian Bureau of Statistics [ABS] (2012).3218.0- Regional Population Growth, Australia, 2009-10. Retrieved from Australian Bureau of Statistics: http://www.abs.gov.au/ausstats/abs@.nsf/Products/3218.0~2009-10~Main+Features~Australian+Capital+Territory?OpenDocument

Australian Bureau of Statistics [ABS] (2017a).2016 Census QuickStats-Franklin(ACT). Retrieved from Australian Bureau of Statistics: http://www.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/SSC80057

Australian Bureau of Statistics [ABS] (2017b). 3218.0- Regional Population Growth Australia, 2014-15. Retrieved from Australian Bureau of Statistics: http://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/3218.0Main%20Features552014-15?opendocument&tabname=Summary&prodno=3218.0&issue=2014-15&num=&view=

ACT Government (2004) The Canberra Spatial Plan. Canberra: Act Planning & Land Authority. Retrieved from: http://apps.actpla.act.gov.au/plandev/sp-pdf/spatialplan.pdf

ACT Government (2008) The Canberra Plan: Towards Our Second Century, Canberra: Chief Minister's Department. Retrieved from: http://www.cmd.act.gov.au/__data/assets/pdf_file/0013/120217/canberra_plan_text_V5.pdf

ACT Government (2009) People, Place, Prosperity: The ACT's Sustainability Policy, Retrieved from: http://www.cmd.act.gov.au/__data/assets/pdf_file/0003/119730/people_place_prosperity.pdf

ACT Government (2012) ACT Planning Strategy: Planning for a Sustainable City, Canberra: Environment and Sustainable Development Directorate. Retrieved from:

https://www.planning.act.gov.au/__data/assets/pdf_file/0008/895076/2012_Planning_Strategy.pdf

ACT Government (2013) Residential Zones in ACT, Canberra: Environment and Sustainable Development Directorate, Retrieved from: http://www.planning.act.gov.au/__data/assets/pdf_file/0005/895406/DV_306_residential_zonesin_the_ACT.pdf

ACT Government (2017a) Franklin, Canberra: The Suburban Land Agency. Retrieved from:http://suburbanland.act.gov.au/en/franklin

ACT Government (2017b) Previous Developments, Canberra: The Suburban Land Agency. Retrieved from http://suburbanland.act.gov.au/en/view-previous-developments

ACT Government and Elton Consulting (2010) Time to Talk Canberra 2030: Outcomes Report, Canberra: ACT Government.

Adams, R. (2011). *Reprogramming Cities for Increased Populations and Climate Change. In E. a. A. Charlesworth*, R. (Ed.), The EcoEdge: urgent design challenges in building sustainable cities (pp. 30-38). London: Routledge

Ambrey, C., & Fleming, C. (2014). Public Greenspace and Life Satisfaction in Urban Australia. *Urban Studies*, 51(6), pp. 1290-1321.

Bobic, M. (2004). *Between the Edges: Street-building transition as urbanity interface*. Bussum (The Netherlands): THOTH Publishers.

Bugliarello, G. (2006). Urban sustainability: Dilemmas, challenges and paradigms. *Technology in Society*, 28, pp. 19-26.

Choay, F. (1969). *The modern city: planning in the 19th century* (M. Hugo & G. P. Collins, Trans.). London: Studio Vista.

Crabtree, L. (2005). Sustainable Housing Development in Urban Australia: exploring obstacles to and opportunities for ecocity efforts. *Australian Geographer*, 36(3), pp. 333-350.

Davison, A. (2006). Stuck in a Cul-de-Sac? Suburban History and Urban Sustainability in Australia. *Urban Policy and Research*, 24(2), pp. 201-216.

Gehl, J. (2011). *Life Between Buildings: Using Public Space* (6 ed.). Washington: Island Press.

Gehl, J. and Svarre, B. (2013). *How to study public life*. Washington: Island Press.

Grant, J. (2002). Mixed Use in Theory and Practice: Canadian Experience with Implementing a Planning Principle. *Journal of the American Planning Association*, 68(1), pp. 71-84.

Hall, T. (2015). What has Happened to the Australian Backyard? *Australian Garden History*, 27(2), pp. 12-15.

Headon, M. (2013). *An ideal city*. In D. Headon & A. MacKenzie (Eds.), Canberra Red, Stories from the Bush Capital (pp. 61-84). Sydney Allen and Unwin.

Jabareen, Y. R. (2006). Sustainable Urban Forms: Their Typologies, Models and Concepts. *Journal of Planning Education and Research*, 26, pp. 38-52.

Jacobs, J. (1961). *The Death and Life of Great American Cities*. New York: Random House

Kashef, M. (2009). Sense of community and residential space: contextualizing New urbanism within a broader theoretical framework. *Archnet-IJAR: International Journal of Architectural Research*, 3 (3), pp. 80-97.

Ramage, E. S. (1973). *Urbanitas: ancient sophistication and refinement*. Oklahoma: University of Oklahoma Press for the University of Cincinnati.

Roisman, F. W. (1998). Sustainable Developments in Suburbs and Their Cities: The Environmental and Financial Imperatives of Racial, Ethnic, and Economic Inclusion. *Widener Law Symposium Journal*, 3, pp. 87-118.

Talen, E. (2011). Sprawl retrofit: sustainable urban form in unsustainable places. *Environment and Planning B: Planning and Design*, 38, pp. 952-978.

Taylor, K. (2007). *Canberra. City in the Landscape*. Canberra: Halstead Press and The National Capital Authority.

Vernon, C. (2006). *Canberra: where landscape is pre-eminent*. In D. Gordon (Ed.), Planning Twentieth Century Capital Cities (pp. 130-149). London and New York Routledge

Ward, S. V. (Ed.) (1992). *The Garden City: Past, Present and Future*. London and New York: Spon Press.

Watson, F. (1927). *A Brief History of Canberra the Capital City of Australia*. Canberra: Federal Capital Press.

Williams, K., Joynt, J., & Hopkins, D. (2010). Adapting to Climate Change in the Compact City: The Suburban Challenge. *Built Environment*, 36(1), pp. 105-115.